BULLETIN OF MISCELLANEOUS INFORMATION Appendix 1939

ROYAL BOTANIC GARDENS, KEW

General

STAFF.—Mr. C. V. B. MARQUAND, M.A., F.L.S., resigned his position as Botanist in the Herbarium on May 31st, 1939 (K.B. 1939, 313). Mr. A. A. BULLOCK, B.Sc., Assistant Botanist, was appointed to succeed him (K.B. 1939, 313).

Mr. C. A. GARDNER, Liaison Officer for the Commonwealth of Australia since March, 1937, left Kew on January 28th, 1939, to return to his post as Government Botanist, Perth, W. Australia. Mr. C. T. WHITE, Government Botanist, Brisbane, succeeded him at Kew on March 7th, 1939, but relinquished his post in October owing to the outbreak of war (K.B. 1939, 162).

Mr. D. G. COLLETT, Botanist for South Africa since September, 1938, returned to Pretoria in November owing to the outbreak of war.

Mr. K. N. KAUL, M.Sc., Demonstrator in Botany at the University of Lucknow, has been selected by the Government of India to succeed Mr. C. E. C. FISCHER as Assistant for India, and commenced work in the Herbarium on July 1st, 1939. Mr. FISCHER is continuing his duties for the present (K.B. 1939, 313).

Dr. E. G. S. BROWN, B.Sc., Ph.D., Temporary Botanist, died on April 5th, 1939 (K.B. 1939, 252). Miss E. A. BRUCE, B.Sc., has been appointed Temporary Assistant Botanist in his place (K.B. 1939, 339).

Mr. J. R. SEALY was appointed Assistant Botanist (temporary) in the Herbarium as from January 1st, 1940.

Dr. J. HUTCHINSON, Keeper of the Museums, has been awarded the Herbert Medal of the American Amaryllis Society for 1939 (K.B. 1939, 251).

OFFICIAL VISITS AND JOURNEYS.—The services of Sir GEOFFREY EVANS were seconded to the Colonial Office from February 3rd to May 1st, as he had been nominated to represent H.M. Government on a Commission appointed by the President of the United States of America, to enquire into the possibilities for settling Jewish refugees of mid-European origin in certain parts of the hinterland of British Guiana. Sir Geoffrey spent about nine weeks in British Guiana and the report of the Commission has since been issued (Cmd. 6014. H.M.S.O., 1939. Price 4*d*.).

THE DIRECTOR attended, as a Government delegate, the Eighth International Congress of Tropical and Sub-Tropical Agriculture,

held at Tripoli from March 13th to 17th, 1939, under the Presidency of Professor Le Plae, Hon. General Director of Agriculture to the Colonies' Ministry, Belgium. Sir JOHN RUSSELL was the Chief Delegate, and delegates were present from Italy, France, Belgium, Holland, Poland, Germany, Bulgaria and other countries.

The Congress was opened and closed by H. E. Marshal Balbo, Governor General of Libya. At the opening meeting, papers were presented by Prof. Armando Maugini on "European Colonization and Native Agriculture in Tropical and Sub-Tropical Countries," by Count Edmond de Warren on "The Agricultural Production of the Warm Countries" and by Prof. Le Plae on "The Professional Preparation of Native Agriculturists through Compulsory Instruction." The Congress then broke up into five sections. The first dealt with the possibilities of agriculture in tropical and sub-tropical countries, Sir John Russell being one of the Presidents of this section. In the second section papers were read on agricultural problems relating to ecology, meteorology, erosion, irrigation and dry culture; while the third dealt with various economic problems such as credit, labour, co-operation and marketing.

The fourth section was in two parts, one devoted to vegetable products of which the Director was one of the Presidents. Numerous papers dealing with cotton, sugar-cane, rubber, olives, citrus, vines, etc., in N. Africa, were presented and also papers dealing with forestry. In the other subsection the papers concerned animal products.

The fifth section was devoted to insect and fungus pests of cultivated crops.

Visits were paid to the Agricultural and Zootechnical Experiment Station near Tripoli where fine new laboratories have just been completed; the grounds contain a very representative collection of citrus species and varieties, and of vines, almonds, and other trees of economic value.

Visits were paid to the new villages of Crispi, Michele Bianchi and Oliveti, which have been recently built. Crispi, only some four months old, is situated in a seemingly desert plain and consists of some 330 farms with a civic centre where the church, town hall with cinema, hospital, school and co-operative store are arranged around a central square.

The farms allotted to each colonist are from 37 to 120 acres in extent according to the locality, part being irrigated for the growing of wheat, lucerne, cotton, etc., the rest being dry-farmed with olive and almond trees and vines.

Bianchi and Oliveti are nearly three years old, and the results due to irrigation and good cultivation were remarkable, since at the start they were founded on sites as sandy and barren as Crispi.

At these two villages the olive and almond trees were flourishing and beginning to bear, and the irrigated crops were in very good condition.

No doubt in Roman times much of this N. African " desert " country was fertile, else such magnificent cities as Leptis Magna and Sabratha would not have been founded.

The new colonist is provided with his house, sheds and farm on trust, together with the equipment and livestock. After a short time on a fixed salary he is placed on a crop-sharing basis for about five years, and in the sixth year he becomes full owner of the farm and assumes direct management. At the end of nine years, when he has paid one-third of his debt, the colonist becomes full owner of his farm. The whole debt is expected to be paid off before the end of the 35th year.

This Eighth Congress was admirably organised by Dr. Gioacchino Dallari, Colonial Adviser of the Fascist Confederation of Land Workers, and his Staff. The majority of Delegates were conveyed from Genoa, Naples or Messina in the s.s. " Roma," a fine cruiser of 30,000 tons, which served as their headquarters during the Congress.

Mr. N. Y. SANDWITH accompanied Mr. N. Douglas Simpson on a collecting expedition by car across Libya and spent 4½ weeks in Italian territory during March and April. They motored across hundreds of miles of coastal desert by way of the splendid Strada Litoranea and then explored the mountain plateaux of Cyrenaica, as far as Derna. Cyrenaica, with its limestone gorges and macchie, resembles a piece of Greece or Crete set in North Africa, and the flora is of remarkable interest. The representation of plants from this region in the Kew Herbarium was previously very poor. Many species and varieties, including some peculiar endemics recently described by Prof. Pampanini, have now been added to the Herbarium. A large number of new records, and possibly some new species, are also represented in the collection and it is hoped to publish a paper of results when it has been fully worked out. On returning to Tripolitania a visit was paid to the Garian plateau which lies to the south of Tripoli. 853 numbers of plants, with duplicates, were collected for the Herbarium.

Miss I. M. DAVIDSON, Library Assistant, attended the 62nd Annual Conference of the Library Association held in Liverpool in June, as a delegate from Kew.

Dr. J. HUTCHINSON paid a visit in June to the National Museum of Wales at Cardiff.

Dr. F. N. HOWES attended the annual meeting of the Museums Association at Cheltenham in July.

Dr. R. MELVILLE attended the summer meeting of the Royal English Forestry Society at Bournemouth in July, visiting the woodlands of Hursley Park, near Winchester, and a number of Forestry Commission plantations in the New Forest, and on Wareham Heath.

THE DIRECTOR attended a meeting of the Advisory Committee on Forest Research of the Forestry Commission at Otterburn from July 7th–10th.

The Assistant Director and Dr. W. B. Turrill attended the Seventh International Congress of Genetics at Edinburgh, from August 23rd–30th.

Dr. J. Hutchinson and Dr. R. Melville attended the British Association meeting at Dundee in September which was interrupted by the outbreak of war.

Official visits were paid by members of the Curator's Staff to the following establishments :—The nurseries of Messrs. Hillier and Sons, W. J. Marchant, Messrs. Maxwell and Beale, Messrs. R. Veitch and Son, and Col. Grey, Hocker Edge, and the Gardens of Lord Swaythling (Townhill Park), Mr. E. A. Bowles (Myddleton House), Lord Ilchester (Abbotsbury), Mr. W. I. Whitaker (Pylewell Park), and Mr. L. de Rothschild (Exbury).

Publications.—Ten numbers of the " Kew Bulletin " were published during the year, and the Review of the work during 1938 was issued as an Appendix. The " List of Seeds " was published as a separate pamphlet ; owing to war conditions a shortened list was issued, reproduced by the cyclostyle process.

The War.—It has been decided by the Minister of Agriculture and Fisheries that the normal work of the Establishment shall at present be continued as far as possible. A number of economies have been made, both in the running of the Gardens and in the issue of publications.

During the first three weeks after the declaration of war the Gardens were closed to the public whilst necessary air raid precaution measures for the staff were being carried out. Since September 23rd they have been open as usual, but Cambridge Cottage Garden and Museum 4 have been closed temporarily, and also the Isleworth Gate. Visitors enter the Gardens at their own risk as no air raid shelters have been provided for the general public.

Seventeen members of the staff have either enlisted or have been called upon for service with the Navy, Army, Air Force, or Civil Defence Forces, as follows :—Botanists (3), Sub-Assistants (1), Student Gardeners (5), Stokers (2), Garden Labourers (1), Constables (4), Boys (1).

A demonstration allotment plot has been laid out on the lawn in front of the Palace and a number of demonstrations are being given to the public by members of the staff. Lectures on allotment management have also been given in the Borough by members of the Curator's Staff and Student Gardeners, under the auspices of the Borough of Richmond War-time Allotments Propaganda Committee.

Arrangements have been made to safeguard the most valuable of the scientific collections both in the Herbarium and in the Museums. The type-specimens in the Herbarium, which number approximately 200,000, are being placed in protective covers preparatory to storage in the basement of the Herbarium, which has been specially strengthened for the purpose.

An Air Raid Precautions organisation has been set up and a number of shelters for the Staff have been built. Members of the Staff are acting as Wardens, and have formed fire and first-aid squads covering the grounds and principal buildings. The fire squad in the Herbarium has been organised so that there have been members on continuous day and night duty since the outbreak of war, while the main first-aid post, situated behind the Herbarium, is continuously staffed during working hours.

Economic Work in Tropical Agriculture

Oiticica (*Licania rigida* Benth.).—This is a native of the dryer regions of Brazil and has considerable commercial possibilities as a source of quick drying oils of the same type as tung oil. Some years ago a few plants were raised from seed at the Imperial College of Tropical Agriculture, but the climate of Trinidad did not prove altogether suitable and accordingly during the year rooted cuttings were received at Kew and from there despatched to Amani and to the Department of Agriculture, Jamaica. It is hoped that these introductions will prove the nuclei for further expansion when conditions in the future become more favourable.

Kubui (*Solanum sessiliflorum* Dun.). This is a large kind of tree tomato suitable for tropical conditions, used for fruit, jams and jellies. Seed collected in the hinterland of British Guiana by the Economic Botanist in March was sent to Kew and a number of plants raised. A few have been despatched for trial to Trinidad, Jamaica and Amani.

Cacao.—One of the most important of our present activities is the introduction of high grade " forestero " types of cacao from the West Indies into the West African colonies. The chief problems are, firstly, the danger of introducing diseases, such as witches broom, from the West Indies into West Africa, where at present they do not occur ; and secondly, the short viability of cacao seed. A number of rooted clones of the special Trinidad types have been successfully transferred to Kew, and at the same time, young plants from Nigerian seed have been raised at Kew. The latter have been used as root stocks, and a number of Trinidad clones budded on these plants have been raised and are now awaiting transfer to Nigeria. The plants are under supervision from officers of the Imperial Mycological Institute, and Kew, therefore, acts as a quarantine station.

As the above process is somewhat cumbersome, it was decided to conduct experiments with cuttings direct from the original plants received from Trinidad. At the time of writing it seems probable that success will crown these efforts, using very young green slips for the purpose.

Bananas.—Seeds of many wild species were obtained during the year from Burma, Nyassaland, Southern Rhodesia, New Guinea,

Assam and Tanganyika. A portion of the seed is retained and planted at Kew and the rest is despatched to Trinidad and Jamaica. This precaution has been found necessary to guard against loss of viability or damage during transit.

Cassava.—Arrangements were made for the collection of a number of *Manihot* species in Brazil for ultimate despatch to Amani, where the work of breeding types resistant to virus diseases is being undertaken. These have not yet arrived, but a dark-leaved type of cassava from British Guiana was sent to Amani.

Five varieties from Malaya were sent to British Honduras after a period of quarantine in Kew.

Passiflora.—In response to a request from Amani, where work on the passion-flower virus is in progress, various authorities in Central America were approached for seed of wild species. As a result, seed of four species from Colombia, three from Venezuela, and one from British Guiana, were sent to Amani, together with four from La Mortala. These were supplemented by the despatch of cuttings of fourteen other species from the collections at Kew.

Papaya.—Somewhat similar work is being undertaken with regard to raising disease-resistant varieties of papaya, and seed of nine species, collected by Mr. A. H. G. Alston of the British Museum in Venezuela and Colombia, were sent to Amani, Ceylon, Jamaica, Trinidad, Fiji and Queensland.

Derris.—Rooted cuttings of special clones of *D. elliptica*, Changi No. 3 and Sarawak creeping, raised from plants originally received from the Department of Agriculture in Malaya, have been sent during the year to Dominica, Jamaica and the U.S.A. Department of Agriculture.

Napier Grass.—Three special clones of *Pennisetum clandestinum* Hochst. ex Chiov. were received from the Department of Agriculture, Kenya, but one clone failed. The other two were propagated and cuttings despatched to the U.S.A. Bureau (for transfer to Hawaii), Jamaica and Trinidad.

In addition to the plants mentioned above, the following is a list of the more important economic plants dealt with at Kew during the year :

Material Received and Distributed.

Barley.—Seeds received from Mr. B. J. Gould, collected on the Sikkim-Tibet border at Kala, 14,600 feet, and Samada, 14,100 feet, sent to the Plant Breeding Institute, Cambridge, and to the Department of Agriculture, Basutoland.

Ephedra Gerardiana.—Seeds from the Forest Research Institute, Dehra Dun, India, sent to Departments of Agriculture in Cyprus, Kenya and Palestine ; the Agricultural and Forestry Officer, St. Helena ; Horticultural Department, Sudan ; and Professor L. D. Hiner, South Dakota State College, U.S.A.

Ephedra intermedia.—Seeds from Forest Division, Punjab, India, distributed to the same institutions as *E. Gerardiana.*

Ephedra sinica.—Seeds from the South Dakota State College, U.S.A., sent to the Departments of Agriculture in Cyprus, Kenya and Palestine; Forest Products Research Institute, Dehra Dun, India; Agricultural Officer, St. Helena, and the Division of Plant Industry, Pretoria, South Africa.

Gossypium Stocksii.—Seeds from Department of Agriculture, Sind, India, sent to the Cotton Research Station, Trinidad, and M. Guy Roberty, French West Africa.

Musa Buchananii.—Seeds from Dr. G. A. C. Herklots sent to Trinidad.

Musa Livingstoniana var. *Chisusu.*—Seeds from Dr. G. A. C. Herklots sent to Trinidad.

Musa Peekelii.—Seeds from Department of Agriculture, New Guinea, collected in New Ireland, sent to Trinidad.

Musa sp.—Seeds from Chief Scientific Officer, Indian Tea Association, Tocklai, Assam, sent to Trinidad.

Musa sp. " Thikmeve-Nget-Pyaw " and " Yethilan-Nget-Pyaw." —Seeds from the Silviculturist, Maymyo, Burma, sent to the Department of Science and Agriculture, Jamaica, and Trinidad.

Peas.—Seed from Mr. B. J. Gould, collected on the Sikkim-Tibet border at Samada, 14,100 feet, sent to the Department of Agriculture, Kenya, and to the Plant Breeding Institute, Cambridge.

Potatoes, Wild varieties.—Tubers collected by Mr. J. Hanbury-Tracey in Venezuela, sent to Dr. R. N. Salaman, Cambridge.

Sweet Potatoes.—Tubers from the Bureau of Plant Industry, Washington, U.S.A., sent to Amani.

Tobacco.—Seed of five varieties received from the Department of Agriculture, Nyasaland, sent to the Imperial College of Tropical Agriculture, Trinidad, for transmission to the Agricultural Officer, Tortola, British Virgin Is.

Wheat.—Seed from Mr. B. J. Gould, collected on the Sikkim-Tibet border at Saugang, 13,400 feet, sent to the Departments of Agriculture, Basutoland and Kenya, and to the Plant Breeding Institute, Cambridge.

Material Received.

Derris elliptica.—Seeds from Singapore Botanic Garden.

Musa sp.—Seed from Dr. G. A. C. Herklots, collected in Ngorongoro.

Musa sp.—Seed from Triangle Sugar Estates, Fort Victoria, Southern Rhodesia.

Musa spp. A. and B.—Seed from Assam.

Ugli Fruit.—Cuttings from Department of Agriculture, Jamaica, and from F. G. Sharp & Co., Jamaica. (Both failed to strike.)

Bambusa spp.—Plants, Dr. G. A. C. Herklots, Hong Kong.

Cassava sp.—Cuttings, Agricultural Officer, British Honduras.

Derris elliptica.—Cuttings, the Director, de Paseos Publicos Montevideo, Uruguay.

Iris florentina.—Plants, Agricultural and Forestry Officer, St. Helena.

Manihot esculenta and *M. heptaphylla*.—Cuttings, East African Agricultural Experiment Station, Amani.

Musa sp.—Suckers, Imperial College of Tropical Agriculture, Trinidad.

Rhamnus Purshiana.—Cuttings, Imperial Chemical Industries, Ltd.

Rheum officinale and *R. palmatum*.—Roots, Department of Agriculture, Kenya.

The Gardens

GENERAL.—From most points of view the year was very satisfactory for the welfare of the plants, as adequate rainfall, evenly distributed, did much to counteract the very dry seasons recently experienced. This is shown by the fact that the water consumption was less by over 10,000,000 gallons than the quantity used in 1938, the figures respectively being 1938—36,941,000 galls., 1939—26,890,000 galls. Spring weather was exceptionally good on the whole, resulting in particularly long displays of wallflowers and tulips, though the duration of the flowers of the Magnolias and other early flowering trees and shrubs was not quite so long. Severe weather was again experienced at Christmas, and on December 21st the hardest spell of arctic weather known in the country for over 40 years commenced. Snow fell and, owing to frost each day, was not dispersed until late in the New Year.

VISITORS.—The number of visitors in 1939 was 1,173,652; weekdays (other than Students' Days) 607,523; Sundays 497,322; Students' Days 68,807—a decrease of 47,828 on the figure for 1938. The greatest monthly attendance was in May, with 352,446; the lowest in September, with 6176 (the Gardens were only open on the 1st and 23rd to 30th inclusive). The highest daily attendance was 84,725 on Whit Monday, and the lowest 5 on December 8th, a very wet day.

ARBORETUM.—Many of our older trees responded well to the increased rainfall during the year. Unfortunately, losses amongst the old beech trees still continue, and nine or ten of these were removed. One or two particularly fine trees have been saved from destruction by the insertion of tie rods and many cavities have been filled in to arrest further decay.

Among the conifers, the most regrettable loss was that of a specimen of *Pinus Lambertiana*, the sugar pine, which was planted

in 1870/71 and had attained a height of 72 feet and girth of 5 feet 10 inches.

During the growing season, one or two of the Catalpas commenced to wilt and die back rather quickly, spoiling the symmetry of the trees and necessitating their removal.

Two fine poplars have been shorn of their beauty. One close to the Sherman Hoyt House, some 70 feet high, had about 50 feet of its upper portion blown off in a heavy gale in the autumn, and a very fine one at the end of the Sion Vista by the river side had to have its top 40 feet removed.

Early in the year the specimens of *Paulownia tomentosa* (= *P. imperialis*) flowered particularly well; also, during the latter part of November and December, the trees of *Prunus subhirtella* var. *autumnalis* were exceptionally beautiful.

Several of the young tulip trees, planted last year to form an avenue along the Broad Walk, unfortunately died and, as the remainder were not very good specimens, they have all been replaced by new trees of suitable size.

The east end of Kew Green, close to the Main Gate, which is part of the Royal Botanic Gardens, has been planted with groups and specimens of flowering trees, such as cherries in variety and species of *Crataegus* and *Malus*.

Seeds of *Elliottia racemosa* were received from Mr. W. Knight, Biltmore, U.S.A., and it is hoped that this rare shrub will once again be an object of interest and beauty in the Gardens.

Temperate House.—The renewal of the lower roof of the central section of the Temperate House was completed during the summer, Canadian red cedar wood again being used for the purpose.

During the autumn the work of replanting the Rhododendron collection in the Himalayan House, as well as those in the Rhododendron Annex, was continued.

The collection of *Fuchsia* species, together with new and old hybrids of garden origin, made a fine display of flowers for about five months until late autumn.

In the warm section a rare conifer, *Agathis vitiensis*, produced a number of silver-grey cones, whilst several plants of the hybrid Bougainvilleas, Mrs. Butt and Orange King, made a brilliant display over a very long period. Many fine climbers considered to be tropical plants thrived and flowered profusely in this section. Some of the best of these were *Passiflora Hahnii*, *P. racemosa*, *P. amabilis*, and *P. quandrangularis*; *Thunbergia grandiflora* var. *alba* also grew rapidly and flowered freely.

Howea Belmoreana bore heavy crops of seed on long pendulous spikes, flowers of both sexes being borne on the same inflorescence. *Hibiscus Waimeae*, a small Hawaiian tree, has now reached a height of 28 feet and produced a multitude of fragrant white flowers during the summer months.

In the central portion the fine collection of Acacias, in pots and planted out in beds, was a prominent feature in the spring, escaping damage by fogs. A batch of five-year-old seedlings of *Lapageria rosea*, raised at Kew, flowered well throughout the autumn and early winter, showing much variation in the size of the flowers and the length of the tube. The rare shrub *Vallea stipularis* produced many clusters of rich rosy-red flowers in mid-summer ; planted out in the border, it has formed a shrub some 10–12 feet in height. A rare Chilian climbing member of the *Compositae*, *Proustia pyrifolia*, trained on the roof of the house, produced many sprays of blush-coloured flowers which lasted for several months and remained attached to the plant until the middle of winter. Among the rarer species of Rhododendron to flower during the year were *R. Taggianum*, *R. Parryae* and *R. xanthocodon*.

Tropical Department.—Palm House.—The work of making good the soil in the permanent beds was continued and a number of new palms and other plants were planted. York stone slabs forming the path have been rebedded in places, and a new truck with pneumatic tyres has been provided.

Ferneries.—Pit No. 6A was repainted inside and out, and a new side bench constructed in reinforced concrete. Permanent beds in No. 2 Ferneries were renewed with fresh soil and many new plants placed in position.

Tropical Pits.—There has been an increase in the number of economic plants dealt with during the year, stock of Cacao varieties, *Derris elliptica*, *Musa* spp., *Manihot utilissima* varieties, *Lonchocarpus Nicou*, *Pennisetum clandestinum* and *Passiflora* spp., being propagated (see also economic section, p. 689).

During the year *Baikiaea insignis* and *Streptocarpus Baudertii* flowered freely, whilst amongst the orchids the following were particularly effective :—*Chilochista phyllorhiza*, *Angulocaste Georgius Rex*, *Cirrhopetalum* "Louis Sander," *Dendrobium tetragonum*, *Lycaste Skinneri* var. *alba*.

Herbaceous Department.—The staff have been fully occupied with continued improvements and alterations. In the Iris Garden exhausted beds have been resoiled and many of the varieties which had become obsolete were replanted with more modern varieties kindly presented by various members of the Iris Society.

The limestone scree at the north end of the Rock Garden was rebuilt, the area being enlarged and undersurface watering provided. As sandstone is used in that part of the garden, the existing limestone was replaced by Sussex sandstone, thus affording better accommodation and more suitable cultural conditions.

At the opposite end of the Rock Garden, facing south-east, the whole of the stone has been lifted and relaid, and the exhausted soil has been renewed. The opportunity has been taken to carry out a more effective grouping of the plants in the section.

Several silver birch trees have been planted in the Wild Garden in order to provide more shade for the ferns and to improve their growing conditions.

A number of new frames built of Canadian red cedar wood have been erected at one end of the propagating yard, to accommodate the increased Alpine collection. Plants of special interest which have flowered during 1939 included *Sedum Gattefossii*, a charming yellow annual, collected by Mr. J. Gattefossé in the Atlas Mountains of Morocco; *Arcterica nana* and *Glaucidium palmatum*, both uncommon plants from Japan; *Dracocephalum Stewartianum*, a native of W. China; *Cyananthus Sherriffii*, raised from seed collected by Capt. Sherriff and Mr. Ludlow on their expedition in S. E. Tibet during 1936; *Helicodiceros muscivorus* (*Araceae*), an uncommon plant from S. Europe, *Cypripedium reginae*, collected in N. America and presented by Mr. F. J. North; *Streptocarpus pusilla*, an interesting plant from S. Africa, presented by Mrs. Garrett-Botfield, and *Notholirion macrophyllum* from bulbs collected in Kashmir by Mrs. Leonard Lees.

Decorative Department.—The best feature of the spring bedding was the display of Darwin tulips and other subjects on the Palm House front, where the beds had been resoiled the previous autumn. Owing to lack of frost and heavy rain these continued in excellent condition for a much longer period than usual.

Many of the summer bedding plants, particularly the Dahlias, flowered exceptionally well, these no doubt having benefited by the showery weather during June and July.

In the conservatory the display was good throughout the year, such subjects as Primulas, Cyclamen, Cinerarias, Calceolarias, Streptocarpus and the winter flowering Begonias being noteworthy. The various types of Chrysanthemum included varieties of the large-flowered Japanese, Decorative, Single, Korean and Cascade, many of these being new in commerce during the last one or two seasons.

Liliums also did well, amongst the most attractive and outstanding being *L. nobilissimum*, *L. myriophyllum* var. *superbum*, *L. ochraceum*, and *L. speciosum* and its varieties. As in past years the bulbs of *L. longiflorum* var. *eximium* presented by the Departments of Agriculture, St. Helena, and Bermuda, gave a fine display of flower. One of the most successful of the winter flowering plants was *Coleus thyrsoideus* which was greatly assisted by the absence of severe fog during its flowering period.

Student Gardeners.—Despite the outbreak of war, which must necessarily affect the movements of students, sixteen men secured appointments on completion of their training, only one less than in 1938.

Six men secured posts in Parks Departments; one was engaged by The Land Settlement Association as Assistant Horticultural Instructor; one went to the National Physical Laboratory,

Teddington; one to St. Benedict's School, Reading; one to St. Thomas More School, Southport; one to the Botanic Gardens, Glasgow; one was engaged by Messrs. Hillier and Son, Winchester, and one commenced in business in Kew as a Landscape Gardener.

Appointments secured overseas were not so numerous as in 1938. One student obtained a position in the Botanic Gardens, Grahamstown, South Africa; one, on exchange in New York Botanical Gardens, was successful in securing an appointment in the Botanical Gardens at Montreal, and another, on exchange at Government House Gardens, Cape Town, was engaged for permanent service in that department.

Three Overseas students, one from Belgium, one from New Zealand and one from Palestine, completed their full course of training during the year and returned to their respective countries.

Nine men from nurseries and private gardens; six from Parks Departments; one from The John Innes Horticultural Institution and one from the Botanic Gardens, Wellington, New Zealand, were selected for full course training; two of these subsequently joined H.M. Forces. It was decided not to fill further vacancies during the remainder of the year.

Exchanges of students were arranged with the Botanic Gardens at Berlin, Munich and New York, also with the Ontario Agricultural College, Guelph, and the Niagara Parks Commission, but with the exception of the two latter, the exchanges had to terminate owing to the commencement of hostilities.

Two students from Holland and one from Germany were admitted for voluntary training during the year.

Rainfall Record.—Rainfall recorded at the Royal Botanic Gardens, Kew, during 1939:—

	Inches.		Inches.
January	4·13	July	2·24
February	·83	August	3·29
March	1·55	September	·85
April	2·28	October	4·87
May	1·32	November	4·59
June	1·66	December	·89

Total 28·50 inches.

The total for 1938 was 20·00 inches.

Ornamental Waterfowl.—The collection has been enriched during the past year by the following generous presentations:—1 pair Black Swans, 1 female Muscovy, and 1 Andean Gander from M. J. Delacour, Clères, France; 1 Versicolor Teal duck from Mr. F. R. S. Balfour, Dawyck; 3 Indian Tree ducks and 2 drakes from Mr. P. Castang, Hampstead; 1 Barrow's Golden-eye duck from Dr. J. M. Derscheid, Sterrebeck, Belgium.

In addition, the following were received:—2 Magellan geese in exchange for 2 Magellan ganders, from Messrs. R. N. Stevens,

Walcot Hall ; and 1 pair Common Shelduck, 1 Common Teal drake, 2 Mandarin drakes, 1 pair Maned Geese, and 1 pair Red Shovellers, from Messrs. McLean & Wormald, Dereham.

Material Contributed To and Distributed From The Gardens, 1939.—During the year, 782 separate consignments of plants, bulbs, seeds, etc., were received and 418 consignments despatched. The annual distribution of seeds amounted to 187 separate consignments, comprising 5042 packets of seeds of herbaceous plants and 3765 of trees and shrubs. The aggregate shows a decrease of 2091 packets as compared with 1938.

Wardian cases of plants were sent to East African Agricultural Research Station, Amani ; Department of Science and Agriculture, Jamaica ; Botanic Gardens, Penang, Straits Settlements (2) ; Department of Agriculture, Western Australia.

Economic Plants.—A list of the more important economic plants received and distributed during the year will be found under the section on Economic Work in Tropical Agriculture, p. 690.

Ornamental and Other Plants.—The following is a list of material of the more important ornamental and other plants received during the year :—

Public Institutions :—

Cambridge Botanic Garden.—A collection of alpine and herbaceous seeds.

Edinburgh Botanic Garden.—A large collection of seeds collected by Messrs Ludlow and Sherriff in S. E. Tibet, 1938/39.

John Innes Horticultural Institution.—Collection of *Streptocarpus* spp. and hybrids.

Kirstenbosch National Botanic Garden.—Collection of seeds.

Lloyd Botanic Garden, Darjeeling.—Collection of seeds.

Pretoria, Division of Plant Industry.—Plants of *Pelargonium Bowkeri*.

Peradeniya Botanic Garden.—Wardian case of plants and a collection of orchids.

Sudan Government Gardens.—Wardian case of plants.

Private Donors :—

Mr. E. K. Balls.—Collection of seeds, bulbs and plants from the Andes of Bolivia, Colombia, etc.

Mr. H. Bruins-Lich.—Collection of South African seeds.

Mr. E. W. Davy.—Plants of *Dahlia Maxonii*.

Mr. P. H. Davies.—Collection of seeds from the Persian plateau.

Dr. R. E. G. Gray.—Collection of *Erica* seedlings.

Mr. A. Grove.—Plants of *Anemonopsis macrophylla*.

Mr. T. Hay, Hyde Park.—A collection of candelabra *Primulas* and *Meconopsis* spp.

Mrs. Kennedy.—A collection of seeds from Cyprus.

Mr. C. H. Lankester.—Collection of orchids and succulent plants from Costa Rica.

Mrs. Leonard Lees.—Bulbs of *Notholirion macrophyllum*, collected in Kashmir.

Mr. H. Q. Levy.—Collection of Jamaican orchids.

Mr. F. Millard.—A collection of choice alpines.

Lord Moyne.—Plant of *Dendrobium veratrifolium*.

Mr. J. W. Page.—Several fine specimen plants of orchids.

Mr. Amos Perry.—Plants of *Arisaema serratum* var. *japonicum* and *A. sikkokianum*.

Mr. C. Sandeman.—Collection of seeds from Peru.

Major F. C. Stern.—Bulbs of *Iris Winogradowii*.

Dr. C. T. de M. Villet.—Collection of South African succulent plants.

National Pinetum, Bedgebury

The most interesting facts to record are the peculiar weather conditions that have prevailed during the year. January was a very wet month and it was followed by several months of very cold weather with a rainfall below the average. At the end of September the rainfall for the year had been much lower than usual. There was, however, a lot of rain during the last three months of the year and the total fall for the year was 38·38 inches. Of this amount 21·35 inches fell in three months. October had the heaviest rainfall with 7·59 inches, and was followed by January with 6·96 inches and November with 6·80 inches.

The screen and ground thermometers used for Meteorological Office records are situated in one of the driest and highest positions in the Pinetum, but two of the other thermometers are placed in much damper places at some 70 feet lower elevation. In these positions the water table is within 9 or 12 inches of the surface after a wet period, and much lower temperatures are recorded than on the higher ground. On the morning of 30th December in a low place near Marshall's Lake 35 degrees of frost were recorded. On the same morning the ground temperature near the screen was 8°F. and the minimum temperature in the screen was 16°F. On the following morning the temperature in the same low place fell to 4°F., the ground temperature near the screen to 12°F., and the minimum temperature in the screen to 24°F. On the morning of December 30th, 17 degrees of frost were recorded on an exposed thermometer 3 feet above the ground at 430 feet elevation in Mr. Dallimore's garden at Bidborough. The Pinetum at Bedgebury varies from 200 to 270 feet above sea level. In May ground frost near the screen at Bedgebury was recorded on 13 mornings, and on 20 mornings in low places. On the morning of 21st May the ground temperature near the screen fell to 26 and the reading on low ground was 19. The highest shade temperature recorded was 81 degrees on successive days, June 6th and 7th. The greatest cold recorded at Bedgebury since we have been recording temperatures, previous to 30th December last, was on 10th December, 1933, when the thermometer on the same low ground fell to 5°F.

Despite the rather unusual weather conditions the growing season was a remarkably good one, and although there were so many cold nights in May, fewer plants than usual were injured by late frosts. This was due to the late spring and the backward condition of growth. The heavy rains of October and November caused some trees to continue growing until very late in the year and there are signs of a little injury to late shoots from the severe frost of late December.

The principal work, apart from upkeep, during the year has been the removal of nurse trees, mostly Scots pine and *Rhododendron ponticum*, with some natural Sitka spruce and Douglas fir, but some time has also been spent laying drain pipes and filling up open drains where they crossed avenues, and smoothing out avenues to facilitate mowing and the access of visitors.

Green aphis on spruce and pine sawfly on pines have required attention during the year, but they were kept in hand without difficulty, and the greatest problem has again been the control of honey fungus. As many tree butts as possible are removed as occasion arises, but the disease continues to take toll of the young trees. Even when a large butt is removed from an affected area it is not possible to trace out all the decayed roots.

Several violent wind storms have occurred, but only one tree has been lost. That was a young tree of *Pinus Pinaster* that had been blown down on previous occasions.

Before the outbreak of war a good many people visited the Pinetum during the week ends, and it was not unusual to have from 60 to 100 visitors on a fine Sunday. The seats erected about the Pinetum have been greatly appreciated.

The Museums

Inquiries for information regarding economic plants and curios have been as numerous as usual, some of them connected with conditions brought about by the war. Since the outbreak of war the Keeper has assisted with the protection of type specimens in the Herbarium, and has completed the determination and description of his collections made in Africa from 1928–30. Duplicate labels have been prepared and despatched to South Africa where sets were left for the Bolus Herbarium and the National Herbarium at Pretoria. As a precautionary measure the large marquetry pictures on loan in No. 3 Museum were returned to the owners, and the larger bottles of spirit-specimens have been taken from No. 1 Museum and stored in a safer place. Recutting and repolishing of the timber specimens in Museum No. 3 has been commenced, and should result in a great improvement in their appearance.

During the last year or two the question of suitable woods for charcoal for use in gunpowder manufacture has been raised, and the possibility has been explored of growing sufficient quantity of the native *Rhamnus, R. Frangula* L., and the closely allied American

species *R. Purshiana* DC., the latter being also the source of cascara.

Another plant about which enquiries have been received is the red squill, *Urginea Scilla* Steinh., an important ratticide, the bulbs of which vary considerably in toxicity.

A large firm of patent food manufacturers has been supplied with information regarding the vitamin value of native or easily obtained plants. Other correspondents have received help with regard to the cultivation of herbs and medicinal plants of which there is likely to be a shortage during the war.

A large number of beans, mainly from trade sources, have been received for identification during the year, particularly in connexion with alternative kinds for livestock, poultry and pigeons, etc. Seeds occurring as an impurity in cocoa beans proved to be those of *Dioclea reflexa* Hook.f., a common tropical climber.

Interest has also been taken in the so-called "giant star grass," *Cynodon plectostachyum* (K. Schum.) Pilger of tropical Africa, which is of very rapid growth, and is a valuable forage plant and soil binder.

Interest in the possibilities of *Ephedra* cultivation continues and the growth of plants raised in East Africa from seed of *Ephedra sinica* Stapf sent from Kew appears to be promising so far. Steps have been taken to procure additional seed of this species. Seed of two Indian species known to yield ephedrine (*E. intermedia* Schrenk & C. A. Mey and *E. Gerardiana* Wall. ex Stapf) has also been despatched to East Africa and to other areas for trial.

The work of checking and adding to the Arboretum Herbarium continued. The identifications of all the *Carya* spp. in the living collection were revised and material was collected to assist in the revision of the cultivated species of *Cotoneaster*. In addition to the routine work of naming plants, a number of requests for identification and advice on control of forest pests were received.

A number of seeds and other plant-organs suspected of poisoning stock were received and advice given on their toxic properties. The advent of the war caused increased interest in unusual fruits and the possibility of their use for making preserves. A sample of fruit-stones used by a gamekeeper for attracting pheasants proved to be *Prunus Laurocerasus* L., cherry laurel. The fruits of this species and the allied *P. lusitanica* L., Portugal laurel, have long been known as a favourite food of these birds.

Among foreign visiting workers, interested especially in tropical economic plants products, were Messrs. F. M. Baud and J. Kort from Holland, and Mr. J. E. A. den Doop, Agricultural Advisor, Anglo Dutch Plantations of Java Ltd., Bandoeng, Java, who spent some time examining *Agave* and allied fibres, both from Museum and living material.

Contributions to the Museums, 1939:—Mr. V. C. G. Cecil, The Peruvian Corporation Ltd., London, E.C.3: material of *Lonchocarpus utilis* A. C. Sm.

Mr. W. S. Dahl, Mortlake, Surrey: balsa wood and balsa wood sawdust (*Ochroma Lagopus* Sw.) from Ecuador.

Mr. J. S. L. Gilmour, Royal Botanic Gardens, Kew: preserved "bakuri" fruit (*Platonia insignis* Mart.), and sample of Indian bamboo-pulp paper.

Mr. L. Wilson Greene, Maryland, U.S.A.: samples of sugar cane wax from Natal, Barbados, Louisiana and the Philippines.

National Institute of Medical Research, Hampstead: bark of *Chondrodendron candicans* (Rich. ex DC.) Sandwith, from British Guiana.

Mrs. A. Norris, Acton: French walking stick made from compressed leaves round a steel rod.

Mr. O. F. Parker, Ealing: box made of various New Zealand woods.

Mrs. P. L. Priestley, Penrhyndeudraeth, N. Wales: seeds of the Chile pine (*Araucaria araucana* C. Koch).

Mr. H. C. Sampson, Chesham, Bucks.: castor oil seeds (*Ricinus communis* L.), from Dahomey.

Miss B. Smith, Westerham, Kent: three ornamental doilies made partly from ferns.

Mr. H. Hamel Smith, Upper Caterham, Surrey: section of wood of *Araucaria* ("chaco").

Mrs. W. B. Stokes, Beckenham, Kent: photographs of the Canadian Timber Exhibit at Wembley Exhibition, 1924.

Lt.-Col. Ellis de Vesian, London: cabbage walking-stick from Jersey.

Jodrell Laboratory

The following are some of the more unusual items among the considerable number of specimens received for identification. A large consignment of tarred ropes; rape seed for the detection of charlock (*Sinapis arvensis* L.) as an adulterant; elm wood from Old Waterloo Bridge; material from between the teeth of a Giant Panda.

Steady progress has been made with the compilation of the new book on the systematic anatomy of the Dicotyledons which was mentioned in last year's report. The collaboration with Dr. L. Chalk of the Imperial Forestry Institute has been maintained, and Dr. M. M. Chattaway of the same institution continued to work on the subject until the outbreak of war.

An account of the experiments on the use of synthetic plant growth substances for facilitating the rooting of cuttings, which were carried out in the gardens with the co-operation of Mr. W. G. Templeman of the Imperial Chemical Industries Research Station at Jealott's Hill, was published (K.B. 1939, 441–456). A few additional experiments with these substances have also been made. The Plant Hormone Committee met at the laboratory in April and decided to sponsor the publication of a propagation index to enable

ready reference to be made to those species and varieties of plants which have been successfully rooted with the aid of "hormones," together with particulars of the conditions under which successful results have been obtained. The index is being prepared by the joint action of several members of the committee, and arrangements are being made for it to be published by the Imperial Bureau of Horticulture and Plantation Crops at East Malling.

The Assistant Keeper attended a number of meetings of the pharmacognosy sub-committee of the committee which is revising the British Pharmaceutical Codex.

Visitors who worked at the laboratory included:—Dr. L. Portheim (The Action of heteroauxin on *Phaseolus vulgaris*); Mr. D. G. Collet (Anatomy of *Senecio*); Messrs. F. M. Baud and J. Kort (Propagation of Cuttings by Synthetic Growth Substances); Mr. J. E. A. den Doop (Fibres and Fibre Plants); Mr. W. G. Templeman (Anatomy of cereal straws). Mr. J. Pryde continued his chemical work on S. African woods, but then left for S. Africa to collect more material. Miss W. M. Curtis completed her work on *Taraxacum*, for which she was awarded the M.Sc. degree of London University.

Drawing and Photography.—The quantity of type specimens photographed this year has been slightly less than usual, due to the outbreak of war. A number of living plants have been photographed or drawn for Kew records; these included some interesting photographs of banana seedlings and cacao plants, and a comprehensive series showing the movements of flower-buds of *Angraecum eburneum* in the course of a month.

More than the usual number of maps and illustrations have been prepared for the Kew Bulletin and other publications, and lantern slides have been made for various purposes to augment the official collection.

Over fifty new photographs of the Gardens have been taken, and 21 are being made into postcards for sale at the publications kiosk.

The Herbarium

Europe, Orient, and N. Africa.

About 6600 numbers have been received during the year. The principal contributors were as follows:—*British Isles*.—Botanical Society and Exchange Club of the British Isles; Mr. J. P. M. Brenan; Mr. C. E. Britton; Mr. J. D. Grose; Mr. P. M. Hall; Prof. Heslop Harrison; Col. H. H. Johnston; Mr. J. E. Lousley; Saffron Walden Museum, Essex; Mrs. Cecil I. Sandwith; Mr. E. C. Wallace. *Continental Europe*.—Natural History Museum, Stockholm; Mr. J. H. Kern (Holland); Mr. J. E. Lousley (Czechoslovakia); Cracow Bot. Gard. (Poland). *Balkan Peninsula*.—Mr. P. Davis (Crete, Greece); Rev. & Mrs. H. P. Thompson (Greece); University of Sofia (Bulgaria); Mr. O. Grebenchikoff (Greece, purchased); Dr. K. H. Rechinger (Macedonia, etc., purchased); Dr. F. Houska

(Yugoslavia, purchased) ; Mr. V. Lindtner (Yugoslavia, purchased). *Orient.*—Mr. J. W. O. Platt (Chios) ; Hebrew University, Jerusalem (Palestine) ; Vester & Co. (Syria, purchased) ; Mrs. Kennedy (Cyprus) ; Mr. C. H. Wyatt (Cyprus) ; Lady Loch (Cyprus) ; Dept. Agric. Cyprus (Cyprus) ; Mr. A. C. Trott (Arabia). *North Africa.*—Mr. P. Davis (Morocco) ; Botanical Museum, Helsinki (Morocco) ; Mr. N. D. Simpson (Tunisia) ; Mr. A. W. Trethewy (Tangier) ; Natural History Museum, Stockholm (Morocco).

Members of the staff have also contributed specimens of British and Scandinavian plants and N. African specimens collected in Libya and Tunisia.

Sir A. D. Hall presented a set of *Tulipa* specimens, cultivated at Merton.

Material has been added regularly to the Genetical and Ecological Herbaria, especially from the Potterne Biological Station and the Herbarium Experimental Ground.

Asia.

Indo-Malaya.—*India* : About 800 sheets were mounted and laid in during the year. Collections have been received from the following sources and have been mostly dealt with : Mr. B. J. Gould (Tibet, Bhutan and Sikkim) ; Mr. R. N. Parker (Punjab) ; Forest Botanist, Dehra Dun (mainly from Kulu and Lahul) ; Forest Botanist, Burma (Burma) ; Lady Joan Legge (United Provinces) ; Professor E. Barnes (S. India) ; Professor Kobli (North India). Smaller collections were sent by Mr. H. W. Tilman (Assam) ; Mrs. Carson-Roberts (Burma) ; Mr. P. V. Mayuranathan (S. India) ; Academy of Sciences, Leningrad (" Pamirs," collector Dr. Fedtschenko). *Indo-China* : Mr. H. B. Garrett and Dr. A. F. G. Kerr (Siam) ; Natural History Museum of Paris (Indo-China).

Malay Peninsula and Archipelago.—About 3270 specimens were incorporated in the Herbarium during the year. In the first half of the year the identification was undertaken of a number of specimens from the Forestry Department, North Borneo, including *Lauraceae*, *Leguminosae* (*Sindora*, etc.), *Rhizophoraceae* (*Bruguiera*, etc.), *Anacardiaceae*, *Apocynaceae* (*Dyera*), and *Irvingiaceae* (*Irvingia*). Specimens of *Podocarpus*, *Dacrydium*, etc., were kindly named by Mr. M. Y. Orr of Edinburgh, and some *Sapotaceae* by Dr. H. J. Lam of Leiden.

The *Lauraceae* and *Myristicaceae* collected by the Oxford University Expedition to Sarawak in 1932 were also named in the early part of the year, and the results published.

The more important collections received from this area were from the Forestry Department, British North Borneo ; Botanic Gardens, Singapore ; Dr. F. A. Rodway (Java).

China, Japan, and N. Asia.—The Sino-Japanese conflict has greatly restricted botanical activities in the Far East, and only one collection of specimens was received during the past year. This

consisted of 645 sheets of Szechwan plants communicated by Dr. W. T. Fang of the Szechwan University.

Owing to the resignation at the end of May of Mr. C. V. B. Marquand (who for many years had been in charge of the Chinese collections) little routine work was carried out.

Africa.

Normal work on the African flora has necessarily been curtailed but a number of collections have been named and determinations supplied. Over 6000 specimens have been mounted and about the same number have been incorporated. Several thousand specimens have also been sorted into duplicate sets for distribution.

A number of collections from various sources have been received for identification, the most important of which are mentioned below.

West Tropical Africa: Mrs. G. W. Harley (Liberia); Dr. F. R. Irvine (Gold Coast); Forest Dept., Nigeria; The Dept. of Agriculture, Sierra Leone (coll. F. C. Deighton). *Cameroons and Congo*: Botanic Gardens, Brussels; Institute des Parcs du Congo Belge. *North East Tropical Africa*: Veterinary Dept., British Somaliland (coll. A. S. McKinnon); Agricultural Research Institute, Sudan (coll. Messrs. F. W. Andrews and J. G. Myers); Sudan Dept. of Agric. & Forests (Mr. J. Robbie). *East Tropical Africa*: East African Agricultural Research Institute, Amani, and Mr. A. P. G. Michelmore (Tanganyika); Coryndon Museum (Kenya); Department of Agriculture and The Forest Department, Uganda. *South Tropical Africa*: Mr. R. A. F. Brenan (Northern Rhodesia); Botanical Institute of the University, Coimbra (Angola); Colonial Garden, Lisbon and Senhor Gomes e Sousa (Portuguese East Africa). *South Africa*: Bolus Herbarium; Natal Herbarium; National Herbarium, Pretoria.

America.

The most important accessions presented during the year were the collections of Mr. John Hanbury-Tracy in Venezuela and Colombia; of Mr. E. K. Balls on the Andes from Colombia to Bolivia; of Prof. T. W. J. Taylor in the Galapagos Archipelago; and a consignment received from the Forest Department of British Guiana which includes many specimens collected on the Pacaraima Range. A very large duplicate set of specimens collected by Dr. A. C. Smith on the Terry-Holden Expedition to British Guiana was received in exchange from the New York Botanical Garden. Mr. G. B. Hinton continues to send valuable consignments of plants from Central Mexico.

The following are the larger of the many useful collections received, besides those mentioned above:—The University of California, Berkeley, the California Academy of Sciences, San Francisco, and Messrs. H. D. Ripley and R. C. Barneby (California); Gray Herbarium (Plantae Exsiccatae Grayanae, cent. 9); Dr. F. J. Herman (Washington); Montana State University (Montana); National Museum, Ottawa, and Department of Agriculture, Ottawa

(Canada, Greenland and Labrador); University of Toronto (Canada); and from Dr. A. Ducke a collection of *Licania* and *Diospyros* specimens from Brazil.

In addition a number of important collections from Canada, Baja California, Sonora and Chiapas Districts of Mexico, British Honduras, Costa Rica and Brazil were purchased.

Australia, New Guinea, New Zealand and Oceania.

Collections were received from Mr. E. Ashby (South Australia); Dr. F. A. Rodway (New South Wales); the North Queensland Naturalists Club, the University of Queensland, Brisbane, and the Brisbane Botanic Gardens (Queensland); Mr. R. A. Black (Victoria); Capt. J. D. McComish (Lord Howe I. and Norfolk I.); New Guinea Department of Agriculture, Rabaul (New Guinea); Dr. H. H. Allan and Mr. G. W. Simpson (New Zealand).

Research was continued on figs from New Guinea and various parts of Oceania.

Orchids.

Numerous collections were dealt with from all parts of the world and an especially interesting series of duplicates was presented by the Botanical Museum of Harvard University.

Research was concentrated on the orchids of Tropical and South Africa, especially the genera *Habenaria* and *Polystachya*.

Gramineae.

Despite war-time duties it has been possible, not only to make good progress with the determination of current collections received for identification from all parts of the world, but also to deal with some of the arrears which had accumulated. Over 2000 specimens have been named, including excellent material of rare or imperfectly known species from Mauritius, British Somaliland, Anglo-Egyptian Sudan, Tanganyika Territory, Northern Rhodesia, Angola, and Mexico. During the year, 2913 specimens were laid-in in the Herbarium and others not yet incorporated were sorted, as in previous years, into genera to make them available for study. Mr. W. Hartley of Canberra again gave valuable assistance in a number of ways, and for several months was engaged on a monograph of the genus *Eriachne*. Miss N. T. Burbidge of the University of Western Australia, spent some time revising the Australian species of *Enneapogon* and studying Western Australian grasses generally.

The more important collections of grasses received are listed below, but it should be noted that most general collections also contain a varying proportion of grasses.

Europe.—British Isles (members of Kew Staff, over 1000 numbers); France (Dr. M. Bouly de Lesdain). *Asia.*—India (a set of excellent specimens of *Saccharum* spp. and *Saccharum-Sorghum* hybrids from the Imperial Sugarcane Station, Coimbatore). *Africa.*—Gold Coast (Forestry Department); British Somaliland

(Veterinary and Agricultural Department ; a collection containing a number of additions to the flora) ; Uganda (Department of Agriculture) ; Nyasaland (Veterinary Department) ; Tanganyika Territory (Mr. H. A. Lindeman) ; South Africa (Natal Herbarium, and McGregor Museum) ; Mauritius (Dr. R. E. Vaughan, and Department of Agriculture). *Australasia.*—Victoria (Mr. R. A. Black) ; New South Wales (Sydney Botanic Gardens) ; New Zealand (Professor Arnold Wall, including specimens of *Festuca* spp. which were cited in publications by Dr. W. O. Howarth and the late M. A. Saint-Yves). *America.*—North America (United States Department of Agriculture) ; West Indies (Mr. H. E. Box, specimens cited in Hitchcock's Manual of the Grasses of the West Indies) ; Argentine (Dr. A. Burkart and Professor L. R. Parodi).

Pteridophyta.

The most important collections received during the year included the following : specimens collected by Dr. A. Peter in Tanganyika Territory, including several type numbers, from the Botanic Gardens and Museum, Berlin, and a set of W. Indian ferns collected and presented by Mr. H. E. Box.

During the year 800 sheets were incorporated, while many more have been sorted and arranged into genera.

Fungi.

Accessions of named fungi have included Sydow, Mycotheca germanica, fasc. 61–64, and Fungi Exotici Exsiccati, fasc. 20–21 ; Reliquiae Farlowianae, cent. 9, from Farlow Herbarium (received in exchange) ; roughly 100 specimens received in exchange from the Rijksmuseum, Stockholm, and 100 specimens of Basidiomycetes from the herbaria of Bourdot, Romell, and Donk, presented by Mr. A. A. Pearson, also type specimens presented by Dr. R. Sprague of Oregon State College and by the Imperial Agricultural Research Institute, New Delhi. Specimens for naming have been received from the National Herbarium, Pretoria, South Africa ; Mr. R. W. Rayner, Trinidad, and Dr. E. Christophersen, Tristan da Cunha, in addition to numerous miscellaneous British fungi.

Considerable time has been devoted to the nomenclature of fungi, in connexion with the Nomenclature Committee of the British Mycological Society, which was appointed to provide material for consideration at the International Congress at Stockholm, now unfortunately postponed.

Algae and Lichens.

Specimens received include 280 Marine Algae from the University of California, some British Marine Algae presented by Mr. W. C. Worsdell, and fascicles 8–11 of " Lichenes Fenniae Exsiccati " presented by the Botanical Museum of the University, Helsinki. Several important collections of Algae and Lichenes which had

accumulated have been laid in to the Herbarium. Specimens received for naming and correspondence with regard to material in the Herbarium have covered a wide geographical range.

Experimental Research.

The Genetical and Transplant experiments at Potterne and research in the Herbarium Experimental Ground have been continued throughout the year with important results which are being prepared for publication. It is hoped to complete as many of the series of experiments as possible in the coming season.

Summary.

The routine work, apart from naming, accomplished during 1939 is summarised as follows :

Specimens mounted	47,494*
,, incorporated	30,509†
,, received on loan to Kew	3570
,, borrowed from Kew	6262
,, presented or purchased	29,100
Duplicates distributed	52,805

Type specimens extracted and placed in special covers, 70,000.

Poison Chamber.

Owing to the outbreak of war, only 17 fumigations were carried out during the year. In addition to the treatment of incoming and borrowed specimens, several thousands of specimens which showed signs of the presence of beetles were removed from the herbarium and passed through the chamber.

Drawings, Photographs and Portraits.

During the past year the Collection of drawings and photographs has been enlarged by the following presentations and exchanges :— 397 photographs of *Stapelieae* presented by Mr. Alain C. White ; 172 photographs from the Division of Plant Industry, Pretoria, and 40 plates (711–750) of the " Flowering Plants of South Africa " ; 38 water colour and pencil drawings prepared for the Botanical Magazine presented by the Royal Horticultural Society ; 25 original pen and ink drawings and 25 copies of plates 3376–4000 of Hooker's Icones Plantarum presented by the Bentham Trustees ; 159 photographs of British Plants with their negatives and index presented by Mrs. H. F. Devis ; 125 original sketches of *Crocus* from Miss M. L. Maw ; 22 photographs of *Pedicularis* from Sir David Prain ; 17 photographs of types of *Erythrina* presented by the New York Botanical Garden ; 192 drawings of Fungi from the Wellcome Research Laboratory. A complete set of 22 coloured plates (about 80 drawings) from Atchley's " Wild Flowers of Attica " was also received and

* Not including the Lower Cryptogams.

† Approximate number, and not including Lower Cryptogams.

27 photos were purchased from Dr. P. R. O. Balley. In addition a large number of drawings and photographs and some portraits of botanists were received from numerous other sources and have also been incorporated in the Collection. Photographs of type specimens have been laid into the Herbarium.

Index Kewensis.

During the year the compilation of Supplement X has gone on steadily. The majority of the periodicals in the Kew Library have been examined up to date and the new names abstracted from them. In addition a commencement has been made on the independent works. One of the compilers spent a short time at the Muséum d'Histoire Naturelle in Paris where she examined certain works which are not represented in the Kew Library, or in the Library of the Natural History Museum, South Kensington.

In addition to the many changes incorporated in Supplement IX, a further valuable innovation is being introduced into Supplement X in that figures of new plants are being specially recorded, such entries being prefixed by an asterisk. The references for the forthcoming Supplement are typed out on cards and have been arranged alphabetically so that they are available for consultation by the staff and by visiting botanists. The present number of entries included in the manuscript card catalogue is about 16,000.

Nomenclature.

As in previous years many enquiries on nomenclatural points have been dealt with. The investigation of some of these has resulted in the publication of certain of the papers cited below.

The usual help of checking works for publication has been afforded to institutes and to individual botanists. A fair amount of work was done in connexion with the VIIth International Botanical Congress which was due to take place in Stockholm in 1940 but which has now been postponed. Considerable progress has been made with the list of correct names of economic plants.

Publications.—Nicotiana Langsdorffii (K.B. 1939, 26); Choice between epithets of the same date (l.c. 34); Ocotea viridis (l.c. 35); Amaryllis and Hippeastrum (l.c. 49); New combinations in the Gramineae (l.c. 101); The correct name for Sesbania aculeata (l.c. 159); The correct name of the common Parsley (l.c. 168); The genus Dalea: new combinations and notes (l.c. 194); Notes on the nomenclature of certain Rutaceae-Aurantioïdeae (l.c. 290); Proposed additions and amendments to the International Rules of Botanical Nomenclature (l.c. 317); Analysis of binary combinations published under Anonymos by Walter, Fl. Carol. (1788) (l.c. 331); Actinocheita (l.c. 337); Sedum Rosea (Journ. Bot. **77**, 126); Notes on British Carices (l.c. 152, 179, 259, 301); Ambiguous elm names (l.c. 244, 266); Rorippa islandica (Oeder) Borbás (l.c. 343); The nomenclature of hybrids (Chron. Bot. **5**, 209).

Visitors.

The total number of visitors in the Visitor's Book for the year 1939 was 3241, and included a number of well-known botanists from the Empire overseas and from foreign countries, in addition to members of various British Institutions, who regularly visit the Herbarium.

The following visitors kindly gave voluntary assistance in the Herbarium :—Mr. H. N. Ridley in naming Malayan specimens ; Miss M. M. Whiting in arranging and classifying the Indo-Malayan material ; Miss June Burroughes and Mr. Ogilvie-Grant in naming European collections ; and, in the earlier part of the year, Mr. W. Hartley rendered assistance in routine work connected with the *Gramineae*.

The Library

With the renewal of the special grant for the arrears of binding, this work was continued during the year and many volumes needing attention were bound or re-bound. Many enquiries of a bibliographical and biographical nature have been dealt with by the Library Staff during the year. Further progress has been made with the work of sorting the octavo tracts, selecting those suitable for binding and transferring the remainder to boxes, a more satisfactory method of filing than that previously adopted, affording better protection from dust and damage.

Many presentations have been made to the Library during 1939. Among those who have kindly contributed are the following :— Lieut. Colonel Sir David Prain has presented the continuation of certain periodicals, and a number of other publications as in former years. The Royal Horticultural Society has presented two copies of their *Lily Year Book*, and the Rhododendron Association has sent its *Year Book* for 1939. A number of books and pamphlets have been presented by Mr. H. N. Ridley. The New York Botanical Garden has sent the continuation of certain of its publications. The Crown Agents for the Colonies have sent *The Birds of Tropical West Africa*, vol. 5. The 8th and 9th volumes of the *Flora URSS* have been received from the Botanical Institute of the Academy of Sciences, Leningrad.

We are indebted to the Bentham-Moxon Trustees for the continuation of several periodicals received in exchange for *Hooker's Icones Plantarum*.

A number of miscellaneous books and papers have been given to Kew by the Director of the Imperial Mycological Institute, while several botanical publications have been sent by the Librarian of the Board of Trade. A number of papers by various authors have been received from Mr. W. C. Worsdell, other presentations have been made by Mr. W. J. Bean, Mr. I. H. Burkill, Dr. T. A. Sprague, Dr. A. F. G. Kerr, Col. C. H. Grey, and many others, both at home and abroad. We are also indebted to many authors for copies of their botanical papers.

The Editor of *Nature* has presented a number of books, and among the publishers who have sent books for review in the Bulletin, are the following :—G. Allen & Unwin ; Angus & Robertson ; Baillière, Tindall & Cox ; J. Bale, Sons & Curnow ; B. T. Batsford ; T. Buncle & Co. ; Cambridge University Press ; Crosby, Lockwood and Son ; McGraw-Hill Publishing Co. ; Macmillan & Co. ; T. Murby & Co. ; Oliver & Boyd ; Oxford University Press ; Putnam & Co. ; J. W. Stacey, Inc.

The following new periodicals have been received during 1939 :— *Journal of the South African Forestry Association*, No. 1 ; *Transactions of the Biological Scientific Research Institute affiliated to the State V.M. Molotov University of Rostov-on-Don*, fasc. 1 ; *Lloydia*, vol. i. nos. 1–4, vol. ii, nos. 1–3 ; *Travaux du Jardin Botanique de l'Université de Moscow*, vols. i & ii ; *Contributions from the University of Michigan Herbarium*, nos. 1–3 ; *Contributions from the New South Wales National Herbarium*, vol. i, no. 1 ; *The Caribbean Forester*, vol. i, no. 1.

Publications of the Imperial Agricultural Bureaux, the Empire Cotton Growing Corporation, and various agricultural, botanical and forestry departments in this country and in the overseas Empire, continue to be received at Kew.

Further maps of the fifth (relief) edition have been sent by the Ordnance Survey Office, Southampton, while additional maps have been presented by the War Office. Other maps have been given by Miss Fischer, Mr. E. Milne-Redhead, and Mr. H. N. Ridley.

ROYAL BOTANIC GARDENS, KEW

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